

Palaeontologists Solve Mystery of 500 Million-Year-Old Squid-like Carnivore

Royal Ontario Museum

Jean-Bernard Caron, Associate Curator, Invertebrate Palaeontology

[Podcast begins with a panning shot of the giant squid suspended in the Schad Gallery of Biodiversity at the Royal Ontario Museum] **Jean-Bernard Caron:** Jean-Bernard Caron I'm just standing beneath the giant squid at the Royal Ontario Museum.

[Cut to shot of Jean-Bernard standing in front of the coral reef in the Schad Gallery of Biodiversity] **Jean-Bernard:** This organism belongs to a group called the cephalopods, which also includes the octopuses and cuttlefish. All these organisms have soft tissues and are usually difficult to find in the fossil record. There are exceptions. There are some forms that develop an external shell.

[Cut to close-up shot of Jean-Bernard handling one of three Nautilus shells arranged on a black table cloth] **Jean-Bernard:** Here is a shell of *Nautilus*, *[pan to show Jean-Bernard in the Schad Gallery]* which is an organism that still lives today. This is a cross-section of the shell, *[Jean-Bernard gestures to the shell he is holding]* showing you the internal *[zoom in on the shell]* morphology of the chambered structure of the shell. Such a shell will eventually preserve relatively well as a fossil. *[Jean-Bernard sets the shell back on the table and picks up a smaller fossilized shell]* And here is an example of a fossil *Nautilus*. *[He turns the fossilized shell to show the interior]* This is the shell itself. The shell shows the same structures, the same internal structures as the modern form. *[Zoom out to show Jean-Bernard; he sets down the fossil and picks up a larger fossilized shell]* Similar shells of cephalopods are known as Ammonites. *[Zoom in on the fossilized Ammonite shell in his hands]* This is a relative to *Nautilus* but this group is now extinct. Now, we are presenting today fossils that don't preserve shells. *[Jean-Bernard replaces the shell on the table].*

[Cut to panning shot of the mountainous landscape of Yoho National Park] **Jean-Bernard:** These fossils come from the Burgess Shale in British Columbia. This is in Yoho National Park *[a group of researchers appear on the mountainside]* and the site is famous for the preservation of soft tissues. *[Zoom in on the group of researchers]* This site is about 300 million years older *[Cut to close up of a gloved hand shifting rock]* than the first dinosaurs, *[a hand points out a fossil in the rock]* when life was only known in the oceans.

[Cut to shot of an open drawer in a collection area; pan to show Martin Smith] **Martin Smith, PhD student, University of Toronto:** So *Nectocaris* was originally known from just a single, fragmentary specimen, *[cut to shot of a fossil]* which made it very difficult to reconstruct what it really would have looked like whilst it was alive.

[Cut to a shot of Martin] **Martin:** Now the field collections the Royal Ontario Museum has been making *[cut to close up shot of fossil specimens in a drawer]* since the 1980s have produced another 90 specimens of *Nectocaris*, *[cut to Martin]* which are much better preserved, and really allow us to give a great image of what *Nectocaris* would have looked like whilst it was alive. *[Zoom in on Martin's hand as he picks up a fossil from the drawer]* Now the important features these fossils show us include two very large tentacles *[cut to close up of the fossil]* at the front of the organism which would have been used for handling prey. It had two large, camera-type eyes, *[cut to still illustrated recreation of the specimen]* the same type of eyes that we have. And it also had large fins on the sides of the organism which would have allowed it to swim actively through the water.

[Cut to close up of fossil specimens in a drawer] **Martin:** Now the most important feature these *Nectocaris* fossils show us is a large, *[cut to close up of a fossil]* nozzle-like funnel *[a circle of light highlights the funnel]* which you can see on the neck of the organism.

[Fade to a close up of a different fossil; a circle of light highlights the internal cavity] **Martin:** This funnel was connected to an internal cavity within the organism itself. This helps us to realize that *Nectocaris* was related to the cephalopods.

[Cut to panning shot of the giant squid in the Schad Gallery] **Martin:** Because modern-day cephalopods have a very similar organ structure within their own bodies.

[Cut to shot of Jean-Bernard in the Schad Gallery] **Jean-Bernard:** *Nectocaris* changes our view about early cephalopod evolution. Before, cephalopods were thought to have evolved from a creeping creature living at the bottom of the sea, more like a snail, with a single dorsal shell.

[Cut to illustrated recreation of the specimen] **Jean-Bernard:** The evolution of a shell was not necessary, as we know now from *Nectocaris* to evolve swimming ability.

[Podcast ends with animated ROM logo and sound sting]